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ABSTRACT

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INTERNET-ENABLED AUDIO COMMUNICATION: A RICHER MEDIUM FOR STUDENTS FEEDBACK?

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ABSTRACT

This study compared the effects of using voice mail (v-mail) to electronic mail (e-mail) over the Internet to provide student feedback using Media Richness Theory (MRT) and Social Presence Theory (SPT) as the theoretical framework. MRT and SPT would predict that v-mail would be perceived as higher than e-mail in media richness and social presence. Results indicate, however, that while v-mail was perceived to have significantly higher social presence, the two media were not significantly different in terms of perceived media richness. Both e-mail and v-mail were perceived as capable of providing a reasonably high quality of feedback. Implications of these findings are discussed.

INTRODUCTION

The rise of Internet computing and related technologies has created a technological platform that allows professors to rethink the way they deliver feedback to their students. Providing timely and appropriate feedback is a must for a student to have a successful learning experience (Nabors, 1999). It can promote student learning, increase student satisfaction with a course and an instructor, and improve course/program completion rates (Hackman & Walker, 1990; Inglis, 1998). Students receive intrinsic feedback while engaging in their learning activities and/or extrinsic feedback through some form of communication with the instructor (Inglis, 1998). Traditionally, the extrinsic feedback is provided either through face-to-face or via written comments on student assignments and exams during the following class meeting or much later. Computer-mediated-communication (CMC) technology has made it possible for students to receive their feedback electronically without having to wait for a meeting with the instructor at a specified time or location. This can reduce the time between submitting an assignment and receiving feedback on the assignment (Inglis, 1998; Xu, 1996).

Due to its ability to support asynchronous communication, text-based e-mail facilitates communication between individuals or groups of individuals (El-Shinnawy & Markus, 1997) and has become a popular communication medium (Inglis, 1998). In a recent study, Blake (2000) noted that most students preferred submitting an assignment as well as receiving feedback via the Internet. In comparing the Internet with face-to-face feedback from the instructors, more students rated receiving feedback through the Internet as extremely effective (64.6% vs. 54.2%) or very effective (27.1% vs. 16.7%). The increased use of e-mail among both students and faculty creates new avenues for delivering feedback to students. Many faculty members have used e-mail to communicate with their students, thus providing immediate feedback and a direct means for communication (Huang, 2000; Nabors, 1999; O'Neill, 1997).

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Bates (1995, p. 202) noted that CMC is "one of the fastest growing technologies, in terms of the number of teachers and learners who are using it." E-mail is one type of CMC that allows for both one-to-one and one-to-many textual communications via a host computer. The recipient can save the e-mail messages indefinitely in computer memory, read or reread them at any time, copy them, change them, or forward them. E-mail provides faster communication with greater efficiency compared to face-to-face communication or postal services. E-mail allows individuals to exchange ideas spontaneously and casually, discuss problems and share skills, coordinate activities, and stay in touch with one another without regard to an individual's physical location (Grunwald, 1990; Huang, 2000; Sproull & Kiesler, 1991).

In spite of the benefits that e-mail can offer, it is a limited symbolic representation system devoid of oratory and graphic appeal. It requires keyboard skills and writing abilities in order to avoid misunderstandings (Bates, 1995; Sproull & Kiesler, 1991). Social and contextual cues that usually regulate and influence group communication dynamics are missing or attenuated. However, when there is a highly developed and shared interpretive context, e-mail is an appropriate communication mode (Huang, Watson, & Wei, 1998; Trevino, Lengel, & Daft, 1987; Zack, 1993). It can be used to complete numerous instructional activities such as course material presentation, collaborative and project work, help hotline, group discussion and group activities, and evaluation (Xu, 1996).

While many faculty members have embraced traditional e-mail as a means of communicating with students, few have ventured beyond text-based communication such as using v-mail systems to communicate with students via voice rather than the text form of e-mail (Huang, 2000). The purpose of this research was to explore the media richness and social presence of the two media, traditional text-based e-mail and internet enabled v-mail, in providing feedback to students, and to compare which of the media, traditional e-mail or internet enabled v-mail, would provide a higher quality of feedback to students. Media Richness Theory (MRT) and Social Presence Theory (SPT) provide the theoretical foundation for comparing the two media. These two theories suggest that one medium may be inherently richer or more socially present than another. While there has been considerable research on MRT and SPT, and measures have been developed to assess the media richness and social presence constructs, there has been little, if any, attempt to reconcile these two constructs, or to apply them within an education and learning context. Therefore, in conducting this study, the following research questions were addressed:

RQ#1) Would students perceive v-mail attachments sent over the Internet to have a higher media richness as compared with more traditional text-based e-mail?

RQ#2) Would students perceive v-mail sent over the Internet to have a higher social presence as compared with more traditional text-based e-mail?

RQ#3) Would students perceive v-mail sent over the Internet to provide a higher feedback quality as compared with more traditional text-based e-mail?

BACKGROUND AND LITERATURE REVIEW

Effective communication has long been recognized as a key element in problem solving and decision making within and among organizations. The emerging information technologies, such as e-mail and v-mail, have expanded communication choices. MRT and SPT have been used to examine the effectiveness and appropriateness of traditional media, such as face-to-face meetings and written documents, as well as new media, such as e-mail and v-mail, in organizational communication.

Media Richness Theory

According to MRT, different media vary in information richness based on their capability of providing immediate feedback, the number of cues involved (i.e., body language, facial expression, tone of voice, etc.), message personalization, and natural languages (Daft & Lengel 1984; 1986). The more attributes the medium possesses, the richer the medium. Based on this definition of media richness, face-to-face communication is considered to be the richest medium because it provides immediate feedback and multiple cues, as well as utilizes natural languages. This is followed in media richness by the telephone which has fast feedback capability but lacks visual cues; "individuals have to rely on language content and audio cues to reach understanding" (Daft & Lengel, 1984, p.

198). Formal written communication is considered even less rich because of slow feedback, limited visual cues, and lack of audio cues.

Based on MRT one would predict that e-mail (which is an asynchronous text-based medium with near instantaneous delivery speed) would fall somewhere between synchronous voice communication and formal written communication (e.g., a letter sent in the mail) in terms of media richness. A study by Zmud, Lind, and Young (1990) provides some empirical support for this. Several studies have shown empirical support for the notion that voice communication (telephone) is perceived as having higher media richness than e-mail (Schmitz & Fulk, 1991; Fulk & Ryu, 1990; and Trevino et al., 1990). While e-mail is text-based (low language variety and cues) and asynchronous, it offers faster communication than paper-based documents, which allows for immediate feedback. Therefore, e-mail has been ranked between face-to-face meetings and letters in terms of its perceived media richness (Trevino, et al., 1990; Trevino, Webster, & Stein, 2000).

MRT would predict that v-mail (which allows for asynchronous voice communication) would fall somewhere between the telephone (which allows synchronous voice communication) and e-mail. Again, the study by Zmud, Lind, and Young (1990) provides some empirical support for this, as does a study by Rice (1992).

Other studies (Dennis & Kinney, 1998; Trevino, Webster, & Stein, 2000; Westmyer, DiCioccio, & Rubin, 1998) have confirmed that for *traditional* media (i.e., face-to-face, telephone, letters, memos), perceived media richness was significantly higher with increased multiplicity of cues and increased immediacy of feedback. However, with respect to *new media* such as e-mail, there has been some debate as to whether or not the medium itself is inherently lean. Studies by Zack (1993) and Lee (1994), for example, suggest that e-mail can be regarded as a rich medium, particularly when those who are communicating have a shared context or understanding. These authors and others would argue that media richness is not an inherent property of the medium, but rather an "emergent property of the interaction of the electronic-mail medium with its organizational context" (Lee, 1994, p. 143). Even proponents of media richness theory have acknowledge that e-mail, because of its rapid delivery, may be quite appropriate for exchanging time-sensitive information, and in this respect it is similar to the traditional medium of the telephone (Rice, 1993; Rice & Case, 1983; Trevino, Lengel, & Daft, 1987).

Social Presence Theory

According to Short, Williams, and Christie (1976), social presence is a subjective quality of the communication medium and relates to the social psychology concepts of intimacy (determined by physical distance, eye contact, smiling, and personal topics of conversation) and immediacy (determined by the media capacity of transmitting information). Therefore, social presence depends on the amount of information transmitted as well as the words conveyed during communication, verbal cues (e.g., tone of voice), nonverbal cues (e.g. facial expression, direction of gaze, posture, dress), and the communication context. Based on this theory, communication media such as face-to-face meetings, which are capable of conveying nonverbal cues and social context cues, are considered to have higher social presence than computer-mediated communication media and written documents because they lack nonverbal feedback cues (King & Xia, 1999). Presumably, the higher intimacy and immediacy the medium has, the richer the medium and the higher the social presence (Daft & Lengel, 1984; 1986; Dennis & Kinney, 1998; Short, Williams, & Christie, 1976; Trevino, Webster, & Stein, 2000).

Rice (1993) used social presence theory to compare traditional and new media by analyzing data from six studies designed to examine the use and effects of new media. He found that due to the lack of social presence, both v-mail and e-mail were ranked lower in their overall task appropriateness than traditional face-to-face meetings and e-mail was ranked even lower than v-mail in both overall appropriateness and for exchanging timely or confidential information.

Based on MRT and SPT, one would expect text-based e-mail to be a richer and more socially present communication medium for providing feedback to students than the written feedback students normally receive on their returned assignments and exams (because e-mail has the ability to provide immediate feedback). However, e-mail would be predicted to be a much leaner and less socially present medium than traditional face-to-face or telephone communication due to its inability to provide the same level of social presence and nonverbal cues. In the same vein, MRT and SPT would predict that v-mail via the Internet should be perceived as a richer and more socially

present medium than text-based e-mail in providing feedback because v-mail has a personal focus and is easier to express in dynamic natural language, whereas e-mail can only convey static visual cues in text.

While social presence and media richness are treated as separate and distinct constructs in the literature, they would appear to be quite closely related constructs. There have been no studies of which the authors are aware that measure both constructs and seek to compare the results. Thus, although one might predict that a medium which is perceived to have higher media richness would also be perceived as having a higher social presence (and vice versa), this has not been demonstrated empirically.

Moreover, no single study has been conducted to compare the effects of using Internet based v-mail to e-mail to provide feedback to students. Recently, internet-based communication technologies have made it possible for individuals to send and receive asynchronous voice communication over the Internet in the form of e-mail attachments more easily. This study was designed to compare students' perceived media richness, social presence, and the quality of feedback associated with v-mail sent over the Internet versus e-mail.

RESEARCH METHOD

To address the research questions of this study, traditional text-based e-mail and Internet-based v-mail were utilized to provide feedback to students. In this study, the traditional text-based e-mail feedback was composed, delivered, and received using standard e-mail software whereas the v-mail feedback was recorded and played back using PureVoice™. PureVoice™ software allows the user to share his or her voice file with anyone in the world who has an e-mail account, access to the Internet, and a computer running on either the Windows or the Macintosh operating system. PureVoice™ is compatible with most e-mail systems, including Qualcomm's Eudora Pro and Eudora Light. The PureVoice™ Player-Recorder lets the user record and send voice messages as e-mail attachments and allows the recipient play back the sender's voice-mail messages on his or her Windows or Macintosh computer with the click of a mouse. Voice messages composed with PureVoice™ have extremely high sound quality—(nearly as high as one would experience in a local phone call made over a high-quality connection). Yet, because PureVoice™ uses compression technology, the messages take up relatively little disk space and can be sent very quickly over the Internet (Qualcomm Incorporated, 1998).

Design

An experimental design was employed in this study. Students enrolled in two graduate courses at a large southeastern university during the 1999-2000 academic year were randomly assigned to one of the two experimental conditions, Internet-based v-mail (v-mail group) and traditional text-based e-mail (e-mail group). Students in the v-mail group received their feedback via an attached voice file sent over the Internet as an e-mail message. Students in the e-mail group received their feedback over the Internet using a traditional text-based e-mail message without a voice attachment. Such an experimental design ensured that students not assigned to the treatment group would not pay a penalty in terms of how quickly they received feedback on their exams from the instructor. A total of 46 students participated in the study with 23 students being assigned to the v-mail group and 23 students being assigned to the e-mail group.

Students in both groups received either voice-based or text-based feedback on their exams in the course. A copy of the exam questions was attached to each e-mail message, regardless of the group to which a student was assigned. When preparing an e-mail feedback message, the instructor composed and edited using a word processor whereas a voice feedback message could only be edited by erasing the message and starting over again (El-Shinnawy & Markus, 1997). In order to provide consistent and high quality feedback to both groups, all feedback for each student was first composed and edited in a word processor, then e-mailed to students in the e-mail group or read to those in the v-mail group. This extra step of composing and editing ensured that students received the same level of feedback and comments regardless of the group to which they were assigned.

Data Collection and Analyses

Students in both groups completed an anonymous questionnaire with each of the two versions tailored to the particular group in which the students were assigned (v-mail or e-mail group). Some students offered additional comments in response to open-ended questions that were included in the questionnaire. Apart from minor modification of wording to reflect the

treatment group to which a student was assigned, the two versions of the survey were designed to be as identical as possible and to allow for comparing responses across the two treatment groups.

The questionnaire included established measures (4-item scales) for media richness (Schmitz & Fulk, 1991) and social presence (Short, Williams, & Christie, 1976), as well as specifically designed items measuring perceived quality of the feedback (see Appendix). The media richness measure was adapted from Schmitz and Fulk (1991) and was based on the criteria specified by Daft and Lengel (1984). This measure has been widely used by others (Carlson & Zmud, 1999; El-Shinnawy & Markus, 1997; Fulk & Schmitz, 1995). The social presence measure was based on an instrument developed by Short, Williams, and Christie (1976). In addition, the questionnaire included 4-item measures for perceived feedback quality, single-item measures for perceived usefulness and perceived ease-of-use of the software, as well as several open-ended questions designed to gather qualitative data from the students regarding their reactions to the feedback mechanism used in the group to which they were assigned. The Appendix holds the measurement items that were used to assess media richness, social presence, feedback quality, usefulness, and ease-of-use.

Both descriptive and inferential statistical analyses were conducted to describe and compare the perceptions of media richness, social presence, quality of feedback, and the usefulness and ease-of-use of the software. Qualitative responses were discussed and related to the quantitative data.

RESULTS

Though the items used to assess media richness and social presence represent established measures, their reliability was assessed using Cronbach's alpha. The four-item measure for media richness had a reliability of 0.61. Statistical analysis revealed that the reliability of this scale could be increased to 0.72 by dropping the first item while retaining the other three items. A decision was made, however, to retain all four items, since they represent an established measure that has been used elsewhere (Carlson & Zmud, 1999; El-Shinnawy & Markus, 1997; Fulk & Schmitz, 1995; Schmitz & Fulk, 1991) and since their reliability was judged to be adequate for exploratory purposes. The four-item measure for social presence had a reliability of 0.83. The four items designed to measure perceived feedback quality were factor analyzed and revealed a single-factor structure. These four items, which measured helpfulness, usefulness, quantity and detail of the feedback received, exhibited high reliability (Cronbach's alpha = 0.86).

A one-way analysis of variance (ANOVA) indicated that there was a significant difference between treatment groups on perceived social presence of the media (F = 28.65, Sig. = 0.000). Specifically, attached v-mail files sent over the Internet (using PureVoice™) were perceived as having significantly higher social presence as compared with text-based e-mail. A similar one-way ANOVA was conducted to investigate whether the same pattern of results would hold true for perceived media richness. This ANOVA, however, revealed no significant difference between treatment groups in terms of perceived overall media richness (F = 0.428, Sig. = 0.517).

Both media (e-mail and v-mail) were perceived as being reasonably rich and relatively high in social presence (mean score 3.74 vs. 3.86 and 3.25 vs. 4.08, respectively, on a 5-point scale with 1 being the lowest richness/social presence and 5 being the highest). As expected, both e-mail and v-mail were perceived to have provided relatively high quality feedback (mean score 3.70 vs. 3.76 on a 5-point scale with 1 being the lowest quality and 5 being the highest). The difference between the two groups was not found to be statistically significant in the one-way ANOVA (F = 0.097, Sig. = 0.756).

The e-mail group perceived that the software they used was both more useful (4.1 mean) and easier to use (4.74 mean), as compared with the v-mail group on these same measures (3.95 mean for usefulness and ease-of-use). The difference in perceived usefulness of the software was not found to be significant (F = 0.421, Sig. = 0.502), but the difference in perceived ease-of-use *was* found to be statistically significant (F = 8.90, Sig. = 0.005).

Tables 1 and 2 provide a representative sampling of the qualitative data students furnished on the survey in response to the open-ended question, "What was the thing that you liked the most about receiving feedback via e-mail/attached voice-mail files?" and "What was the thing that you liked the least about receiving feedback via e-mail/ attached voice-mail files?"

TABLE 1
REPRESENTATIVE RESPONSES TO THE QUESTION, "WHAT WAS THE THING THAT YOU LIKED THE MOST ABOUT RECEIVING FEEDBACK VIA E-MAIL/ATTACHED VOICE-MAIL FILES?"

E-mail Group	V-mail Group
Could be printed and filed/shared. Could easily refer to earlier/later sentences within the e-mail.	It was good to hear comments and be able to form an impression of the instructor's view/expectation of work.
It gave me sometime to reflect on the answer. Also, it was useful in providing feedback and questions to the instructor.	I like the real voice from instructor. From that, I know that instructor really read/graded my paper. Otherwise, I really wonder/doubt that the instructor read it or not.
Timely: can get the feedback before the next class. Personal: feedback is based on my own performance and more focus, more specific. Easy to reference: since it is a written message, it's very easy to use as a reference.	It attached a human to the exchange. Also I believe, it gave a more honest evaluation in the sense that I did not interpret correctly or incorrectly what the words mean (i.e., inflection, posture, regulative). It was right there.
The rapidity and completeness. I liked knowing what I got on the exam and why before I got the exam back.	It is really to identify the points that you wanted to stress. The inflection of your voice.
Easier to read than on a copy, usually more detailed— having it in another place than on a copy force you to think and retrace what you wrote.	I think it allowed for more timely response. Forming an answer and recording is faster than writing it out and seems to allow the responses to be returned to us faster.
The timeliness of the feedback—getting results in private. More personal than class review.	I felt like you are probably more familiar with us, the students, and that you spoke to each of us "on our level."
E-mail feedback is descriptive and tailored to individuals	Tailored, customized and more personal.
Getting feedback before class.... More one-on-one feedback than class time.	Psychological. Make me feel differentiated from the class. Easy to understand than to read someones handwriting.
I liked the timely nature and availability. It is nice to be able to reference the comments.	The potential timeliness of feedback. Ability to say what you mean may be quicker and easier than writing.

TABLE 2
REPRESENTATIVE RESPONSES TO THE QUESTION, "WHAT WAS THE THING THAT YOU LIKED THE LEAST ABOUT RECEIVING FEEDBACK VIA E-MAIL/VIA ATTACHED VOICE-MAIL FILES?"

E-mail Group	V-mail Group
No info written on test. If I look a test in the future I will have to find the e-mail message.	Not readily referable. Have to play back several times if you don't understand part of points.
I think of the two forms of written communication e-mail & handwritten on exam, the latter is richer. Professors tend to write little notes next to item, from which I infer more than summaries of grading of my answers.	With the voice responses it is not as easy to move backwards and forwards in the response to pinpoint and coordinate with each section of the test. I had to listen to the response all the way through. It was not always easy to get to the right place.
Not having my answers to compare to comments/grading. Scanned test with answers would be ideal attachment, but not practical for large class.	Making myself take the time to do it. Using the normal method was more convenient since I am in class and everyone else is reading over their test at the same time.
The comments could not be specifically related to answers on the exam. You are not able to see a comment next to a specific area.	The initial setup of the plug-in. A URL for the plug-in with the e-mail, or, a pilot e-mail with plug-in URL to test sample would have been good.
The e-mail comments were too general.	In transmitting the message or information, it isn't much different from e-mail in usefulness and effectiveness
I didn't have my exam back yet, so couldn't remember exactly what I wrote to compare it to the feedback.	If you did not do well, it feels like the professor is in front of you telling you the bad news.

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As the comments in the two tables reveal, students in both treatment groups appreciated the timely and personalized feedback. Although students in both groups had copies of the exam questions, both groups found it frustrating to relate the feedback to their own exam answers. This frustration was caused by two factors: (1) students received feedback before they received the hardcopy of their exam answers, and (2) the feedback was not on the exam itself. Students in the v-mail group experienced additional frustrations in that they had to install the PureVoice™ software and had to replay the entire message multiple times in order to access specific portions of the feedback. It is clear, however, that students in the v-mail group appreciated the higher social presence of the medium, whereas students in the e-mail group appreciated receiving the text-based feedback because it could be printed, filed, shared, used as a reference and accessed in a non-sequential (direct or random) manner.

DISCUSSION AND IMPLICATIONS

Perceptions of social presence observed from this study were consistent with SPT. As SPT would predict, attached v-mail files sent over the Internet were perceived as having a higher social presence than e-mail. In accordance with MRT, v-mail was perceived to be slightly higher than e-mail in terms of media richness. However, this difference was not found to be statistically significant, and in fact e-mail (which is often regarded as a lean medium) was perceived as being a reasonably rich communication medium. This suggests that the two constructs—media richness and social presence—are somewhat separate and distinct.

Although the difference in overall media richness perceptions was small and statistically insignificant, it was noted that e-mail was perceived to be significantly richer in "giving and receiving timely feedback" than v-mail (mean score 4.57 vs. 3.96 on a 5-point scale with 1 being the lowest richness and 5 being the highest, $F = 10.08$, $p = .003$). This might have affected the magnitude of the overall media richness perception because such a significantly different richness perception occurred in the opposite direction to the other three items measuring the overall media richness perception.

Perceived media richness may have also been affected by the perceived ease-of-use and previous knowledge of and experience with the software. Based on the experimental design, both groups physically received their feedback via e-mail or v-mail at the same time, but they perceived the timeliness of the media differently. This could be explained by the fact that individual perceptions of media richness are influenced not only by objective media characteristics (Rice, 1993; Trevino, Webster, & Stein, 2000), but by individual's experience with the medium (Carlson & Zmud, 1999; Fulk & Schmitz, 1995; King & Xia, 1999; Schmitz & Fulk, 1991), interaction between the individual and technology (media experience, preference, and skill) (Rice, 1992; Trevino, Webster, & Stein, 2000), perceived usefulness (Fulk & Schmitz, 1995), and perceived ease of use (the extent to which an individual believes that using a particular technology system would be free of effort (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; Trevino, Webster, & Stein, 2000).

In this study, all of the subjects were graduate students who had extensive experience with e-mail and Internet usage, but no one had prior experience of using v-mail software. Although PureVoice™ was easy to use, it was new software and had to be installed for the first time for the students in the v-mail group. This not only affected an individual's media experiences and expertise, but may have also influenced the perceived ease-of-use (e-mail software was perceived to be significantly easer to use than v-mail software, $F = 8.90$, Sig. = 0.005). This might have influenced students' perception that e-mail was a significantly richer medium in "giving and receiving timely feedback" than v-mail. The qualitative data collected provides an indication that at least some students found the initial setup of the PureVoice™ software (downloading/installing the plug-in) to be somewhat inconvenient. In contrast, students in the e-mail group (who presumably already had access to e-mail software) would not have had to deal with downloading and installing any special software.

Putting the issue of timeliness aside, it is still possible that v-mail simply may not be perceived as a richer medium than e-mail in providing feedback to students via the Internet. For the other three items measuring the overall media richness ("transmitting a variety of different cues beyond the spoken message," "tailoring messages to your own or other personal characteristics," and "using rich and varied language"), v-mail was perceived as a somewhat richer medium than e-mail. Such differences, however, did not reach statistical significance ($p > .05$).

The fact that v-mail was not perceived to be significantly higher than e-mail in terms of media

richness appears to run counter to MRT. However, it is consistent with some research studies that have suggested that e-mail can, in fact, be a rich medium (Lee, 1994; Zack, 1993).

Both the e-mail group and the v-mail group perceived feedback quality to be reasonably high and there was no significant difference between the two groups. This indicates that the step of composing and editing feedback for each student beforehand did control for the quality of feedback. In addition, this result suggests that perceived feedback quality may be influenced less by the type of *medium* that is used, and more by the actual *content* of the feedback. This study did not compare the quality of feedback provided by these two new media with that provided by more traditional media such as paper-based or face-to-face. Therefore, it is impossible to say that either e-mail or v-mail produces higher quality feedback than the traditional media do. One advantage of providing text-based or voice-based feedback to each student individually via the Internet was that it avoided student complaints of embarrassment or invasions of privacy noted by Blake (2000). In this study, no students expressed their dissatisfaction in this regard and at least one student mentioned "getting results in private" as one of the things that s/he liked the most.

Students in the v-mail group experienced frustration because they could only access portions of the feedback in a sequential fashion (by playing back the entire message) as compared with a text-based message that can be more easily scanned in a direct access (non-sequential) fashion. This finding is consistent with the literature (El-Shinnawy & Markus, 1997; Valachich, Paranka, George, & Nunamaker, 1993). E-mail's text quality helps people interpret the message accurately, and it is easier to process, filter and transfer than v-mail. A recipient of e-mail messages has random access to any of the messages in his/her inbox and the recipient can scan through a message in order to get to the important points, whereas a v-mail recipient has to go through all the v-mail messages sequentially and if there is a long sequence of messages, the cognitive overload tends to be higher.

Both e-mail and v-mail appear to be useful media for receiving feedback from the instructor and both are easy to use. In this study, both e-mail and v-mail received a high mean score (4.13 and 3.95 respectively on a 5-point scale with 1 being the lowest usefulness and 5 being the highest). This perceived high level of usefulness might relate to the relatively high quality of feedback students perceived because students in both groups ranked quality of feedback above 3.70 on a 5-point scale with 1 being the lowest quality and 5 being the highest. With regard to the ease-of-use perception, e-mail was perceived to be significantly easier to use than voicemail (presumably because v-mail was new to the students and required them to download software for the initial installation).

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

As with all studies, this one is subject to certain limitations. First, while useful data were gathered to assess media richness, social presence, feedback quality, usefulness, and ease of use, there was no attempt to measure the possible impacts of different feedback channels (e.g., e-mail and v-mail) on learning outcomes.

Second, this study only compared the quality of feedback provided by two Internet-based media (text-based e-mail and v-mail attachments sent via e-mail). It is impossible, based on the results from this study, to tell whether these Internet-based media provide a higher quality of feedback as compared to paper-based or face-to-face feedback. Future studies should be conducted to include both traditional and Internet-based media that can be used to provide feedback to students.

Third, since all of the study subjects were graduate students majoring in computer information systems, generalizations to other populations should be made with caution. Similar studies should be conducted in other student populations as well as among employees who receive feedback from coworkers or supervisors.

Fourth, in order to reduce the overall length of the questionnaire, perceived usefulness and perceived ease-of-use were both assessed by single item scales, which cannot be evaluated for reliability. Ideally, a multi-item scale should be used to assess each of those two measures.

Finally, the finding that v-mail is perceived as having higher social presence than e-mail, but that the two media are not perceived as being significantly different in terms of media richness and media richness, suggests the need for further research into the subtle distinctions that may exist between these two constructs and the way in which they have been operationalized.

CONCLUSIONS

This study has shown that both e-mail and v-mail can be used to provide timely, high quality feedback to students. Perceptions of social presence observed in this study were consistent with the predictions of SPT; v-mail was perceived to have higher social presence than e-mail. However, the two media were not perceived to be significantly different in terms of media richness, casting some doubt on the applicability of MRT in this context. These results suggest that while the two constructs are related, there may be important nuances of difference in their conceptualization and operationalization that merit further study. The findings also lend some support to the notion that perceived media richness may not result from an inherent property of the medium, per se, but may result from some combination of the medium, its properties, and the social context in which the medium is used.

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APPENDIX
CONSTRUCTS AND MEASURES

Media Richness

We are interested in **your** perceptions of the **richness of this medium** along the following dimensions. Information richness is defined as the potential information-carrying capacity of data. If the communication of an item of data, such as a wink, provides substantial new understanding, it would be considered rich. If the datum provides little understanding, it would be low in richness. This concept of richness is also believed to apply to the richness of information that can be carried on different communications media. This is known as **media richness**. For each dimension of **media richness** below, **circle the number that best expresses your perception of [e-mail/attached v-mail file] as a communication medium.**

MR1. Giving and receiving timely feedback.

Not at all Rich				Extremely Rich
1	2	3	4	5

MR2. Transmitting a variety of different cues beyond the spoken message (non verbal cues).

Not at all Rich				Extremely Rich
1	2	3	4	5

MR3. Tailoring messages to your own or other personal characteristics.

Not at all Rich				Extremely Rich
1	2	3	4	5

MR4. Using rich and varied language.

Not at all Rich				Extremely Rich
1	2	3	4	5

Social Presence

Different media are believed to have varying levels of social presence. The capacity to transmit information about facial expression, direction of looking, posture, dress, and non-verbal cues all contribute to social presence of a communications medium. For each dimension below, **circle the number that best expresses your perception of the social presence of [e-mail/attached v-mail file] as a communication medium.**

SP1. Impersonal				Personal
1	2	3	4	5

SP2. Cold				Hot
1	2	3	4	5

SP3.	Dehumanizing				Humanizing
	1	2	3	4	5
SP4.	Insensitive				Sensitive
	1	2	3	4	5

Feedback Quality

Please evaluate the **quality of the feedback** that you received on your exams along each of the following dimensions.

The feedback I received on my exams was:

FBQ1	Not Very Helpful				Very Helpful
	1	2	3	4	5
FBQ2	Not Very Useful				Very Useful
	1	2	3	4	5
FBQ3	A Little				A Lot
	1	2	3	4	5
FBQ4	Not Very Detailed				Very Detailed
	1	2	3	4	5

Usefulness

Rate the **usefulness of [e-mail/v-mail]** as a medium for receiving feedback.

Not at all Useful				Extremely Useful
1	2	3	4	5

Ease of Use
Rate the **ease-of-use of [e-mail/v-mail] software** as a medium for receiving feedback.

Not at all Easy				Extremely Easy
1	2	3	4	5

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